US 20190204667A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2019/0204667 A1**

CAO (43) **Pub. Date: Jul. 4, 2019**

(54) **COA-TYPE ARRAY SUBSTRATE**

(71) Applicant: **Shenzhen China Star Optoelectronics Semiconductor Display Technology Co., Ltd.**, Shenzhen City, Guangdong (CN)

(72) Inventor: **Wu CAO**, Shenzhen, Guangdong (CN)

(21) Appl. No.: **15/749,293**

(22) PCT Filed: **Jan. 12, 2018**

(86) PCT No.: **PCT/CN2018/072512**

§ 371 (c)(1),
(2) Date: **Jan. 31, 2018**

(30) **Foreign Application Priority Data**

Dec. 29, 2017 (CN) 201711484164.6

Publication Classification

(51) **Int. Cl.**

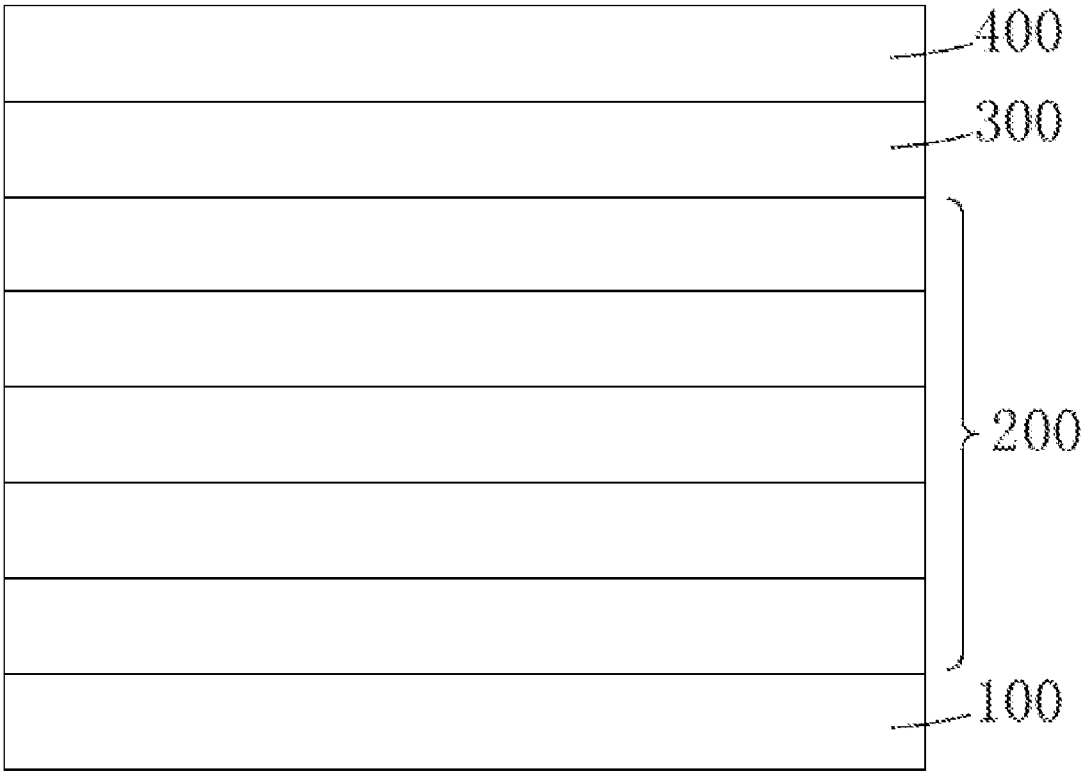
G02F 1/1335	(2006.01)
G02F 1/1343	(2006.01)
H01L 27/12	(2006.01)
G02F 1/1362	(2006.01)

(52) **U.S. Cl.**

CPC .. ***G02F 1/133514*** (2013.01); ***G02F 1/133512*** (2013.01); ***G02F 1/134309*** (2013.01); *G02F 2201/123* (2013.01); ***G02F 1/136286*** (2013.01); *G02F 2201/121* (2013.01); ***H01L 27/124*** (2013.01)

(57) **ABSTRACT**

The disclosure provides the COA-type array substrate, which is realized by all or part of the outer edge of the color-resisting units are located on the first metal layer and/or the second metal layer, which is used for padding to reduce the topography difference at the outer edge position of the color-resisting units, so that the thickness of the photoresist coated on which is reduced to be easily removed by the exposure and development when the transparent conductive layer is patterned; in addition, both the first metal layer and the second metal layer have a reflective property, so that the exposure effect can be enhanced and the photoresist coated on which; the COA-type array substrate of the disclosure can eliminate or reduce the metal oxide residue at which through the above two effects and prevent the electrical signal of the pixel electrode from being uncontrollable.



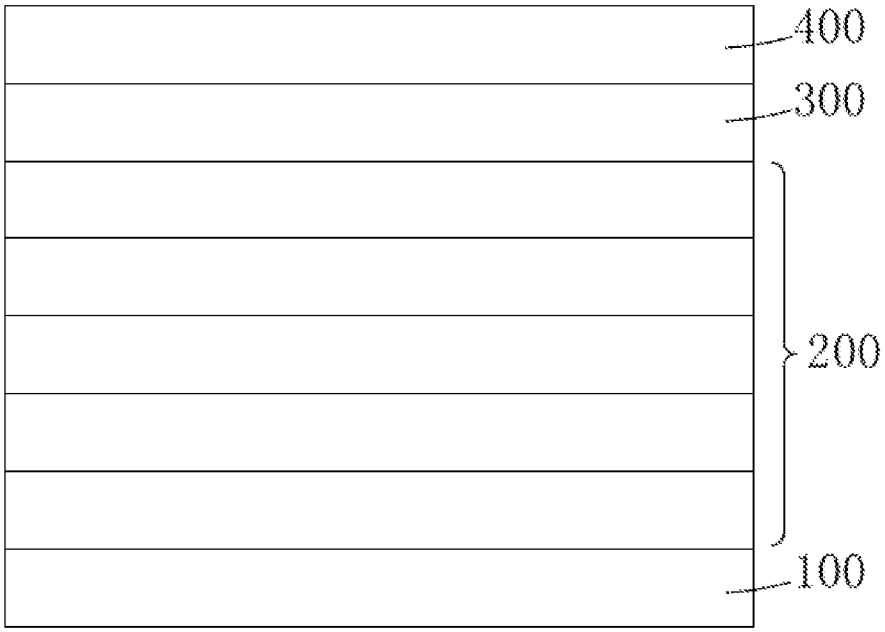


FIG. 1

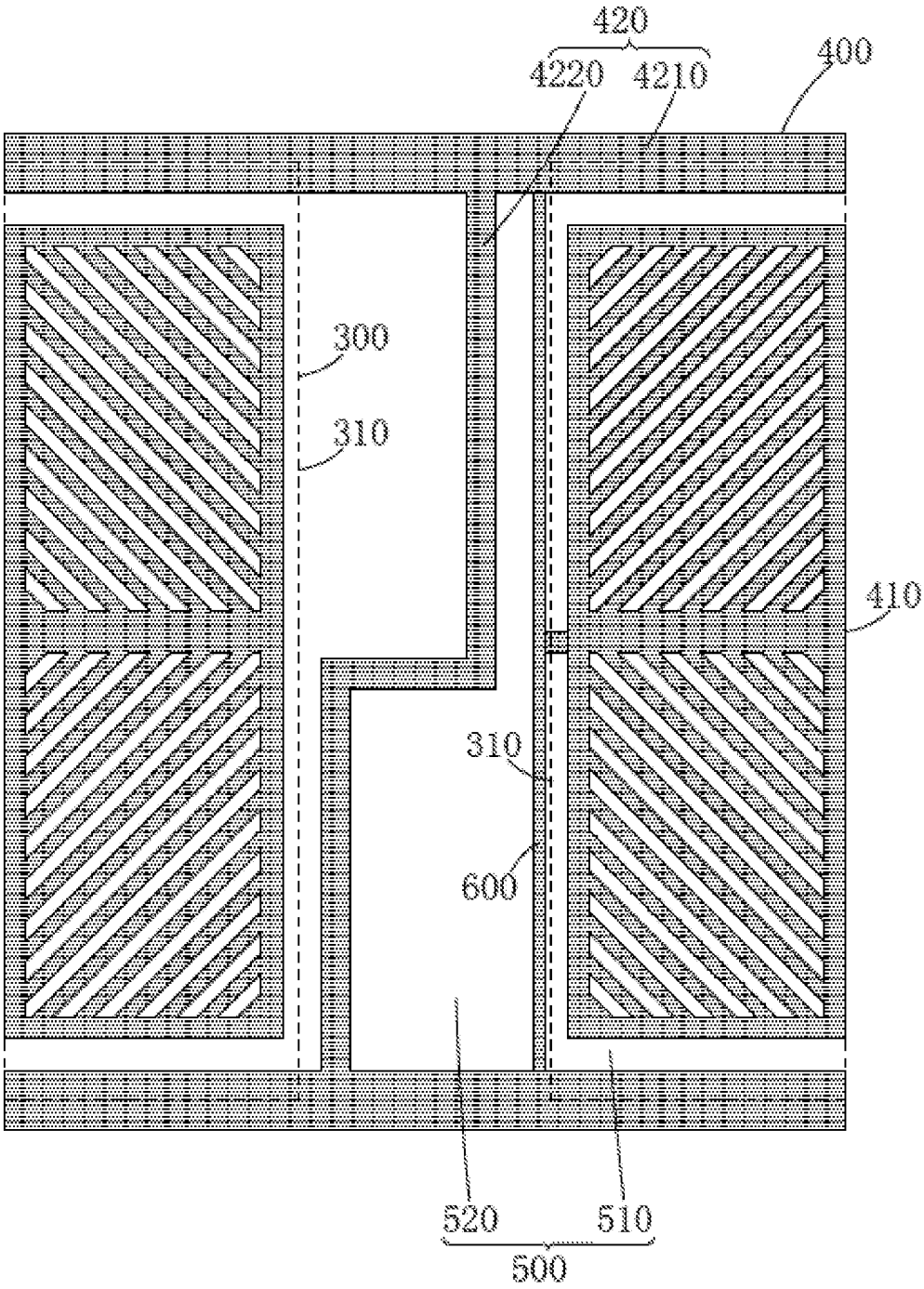


FIG. 2

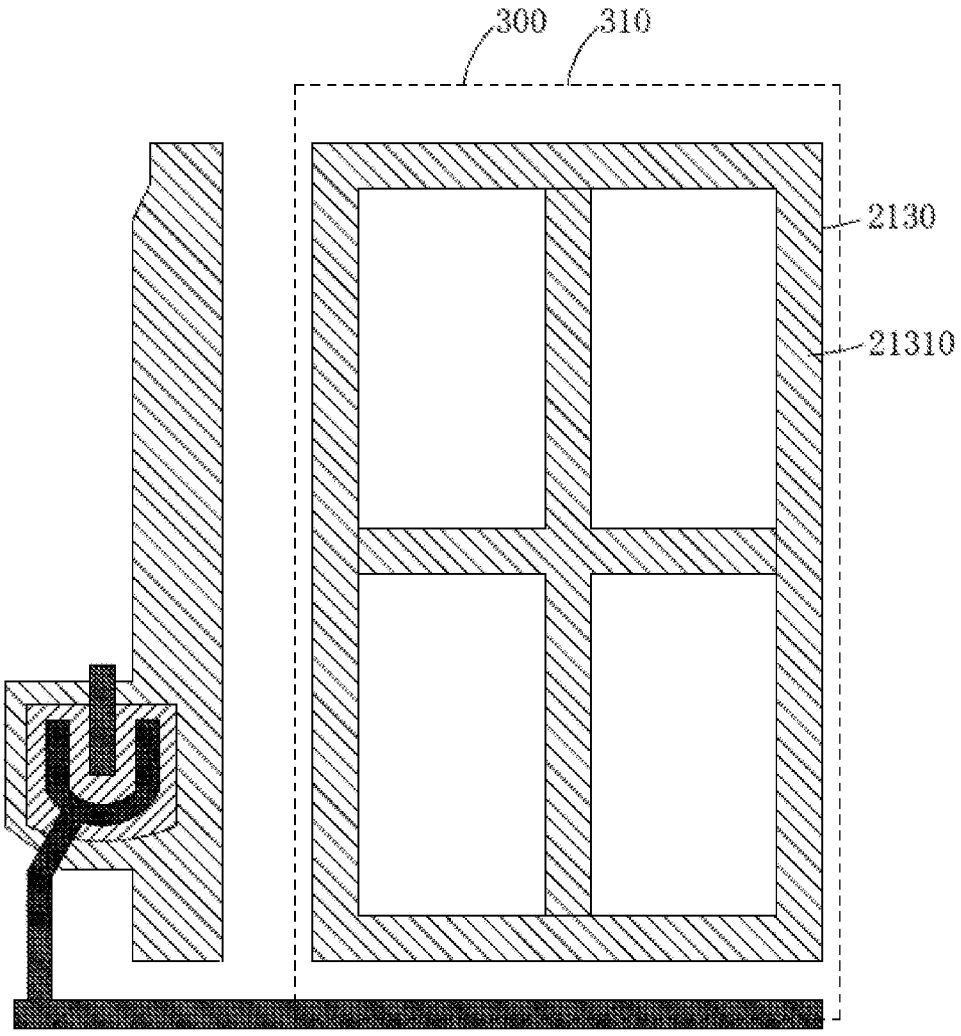


FIG. 3

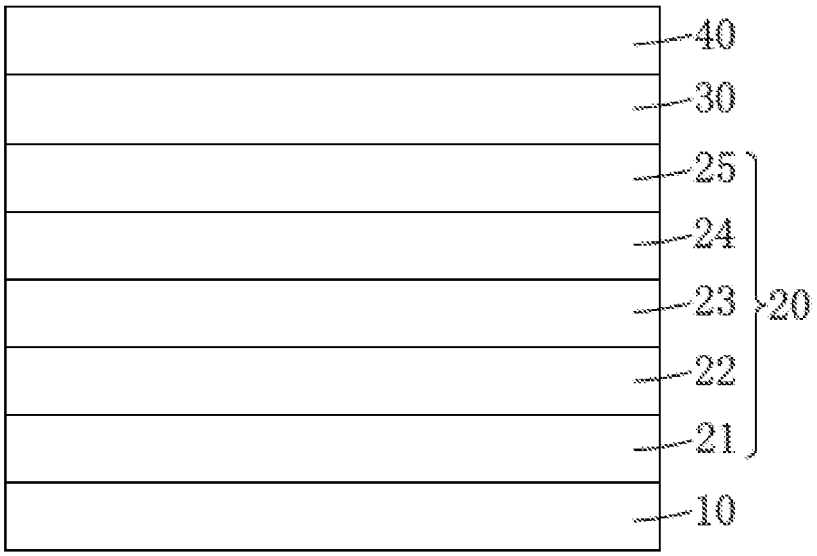


FIG. 4

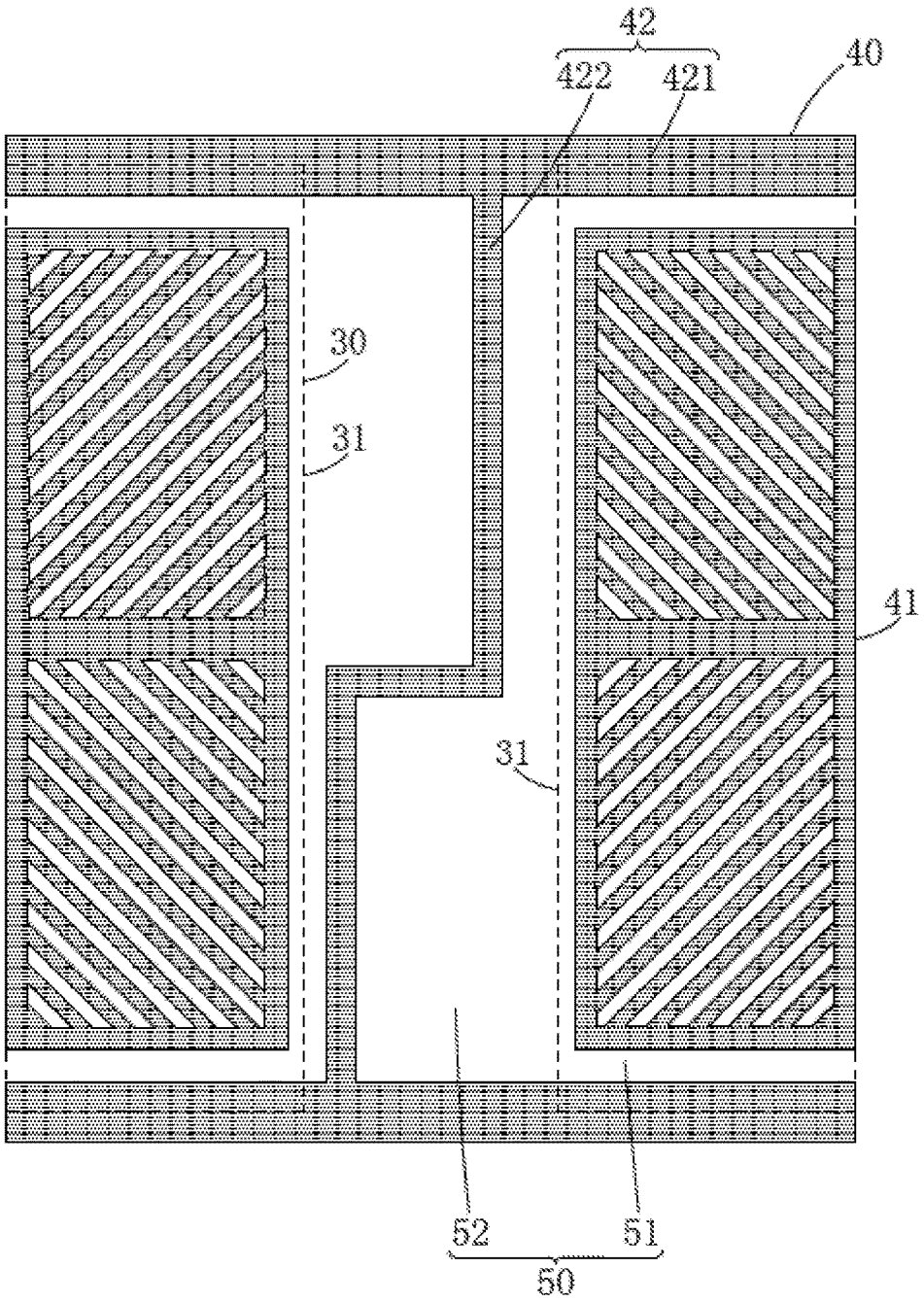


FIG. 5

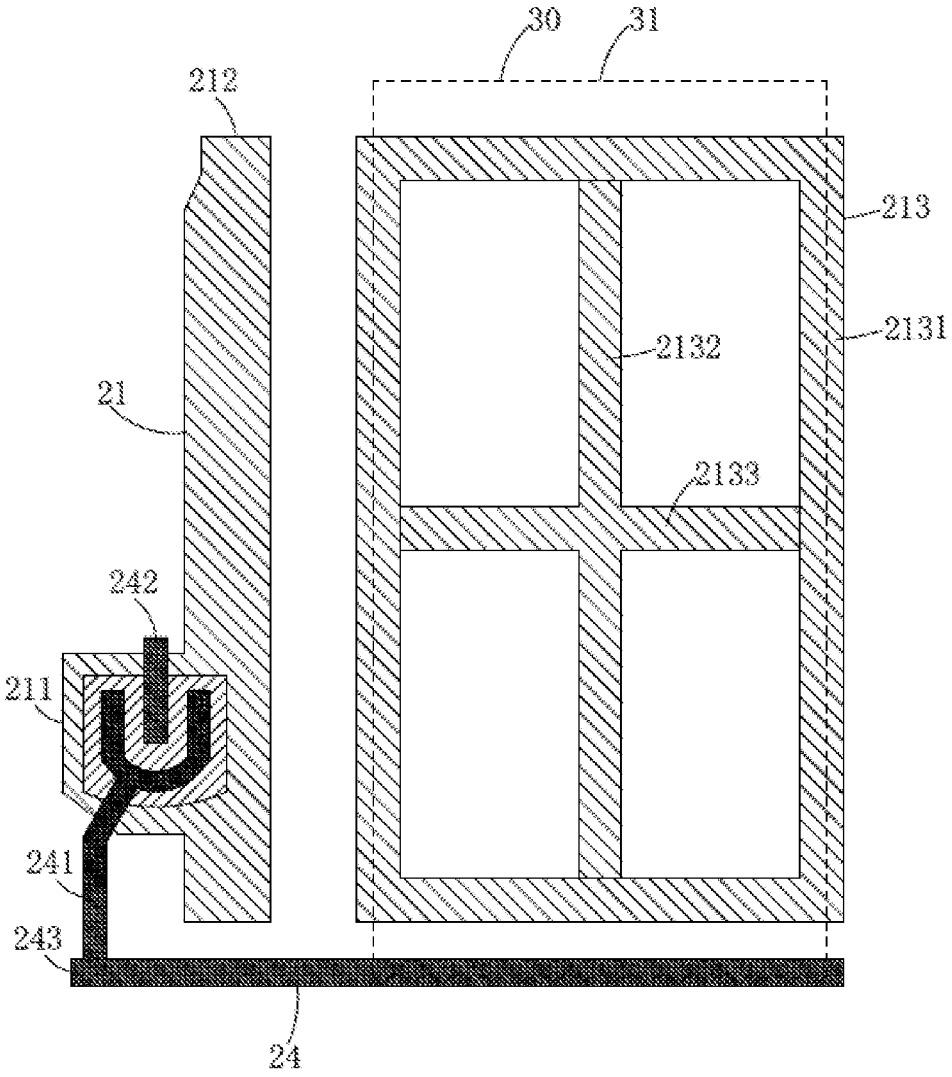


FIG. 6

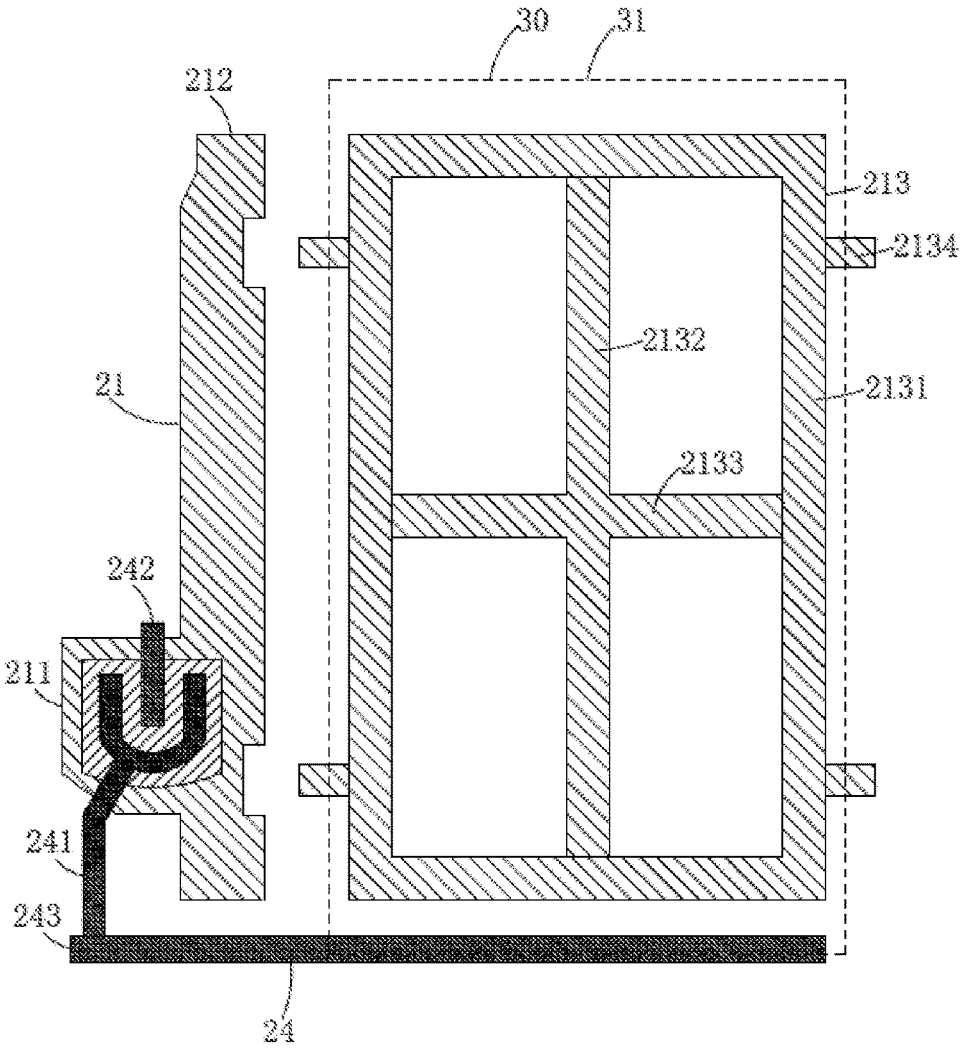


FIG. 7

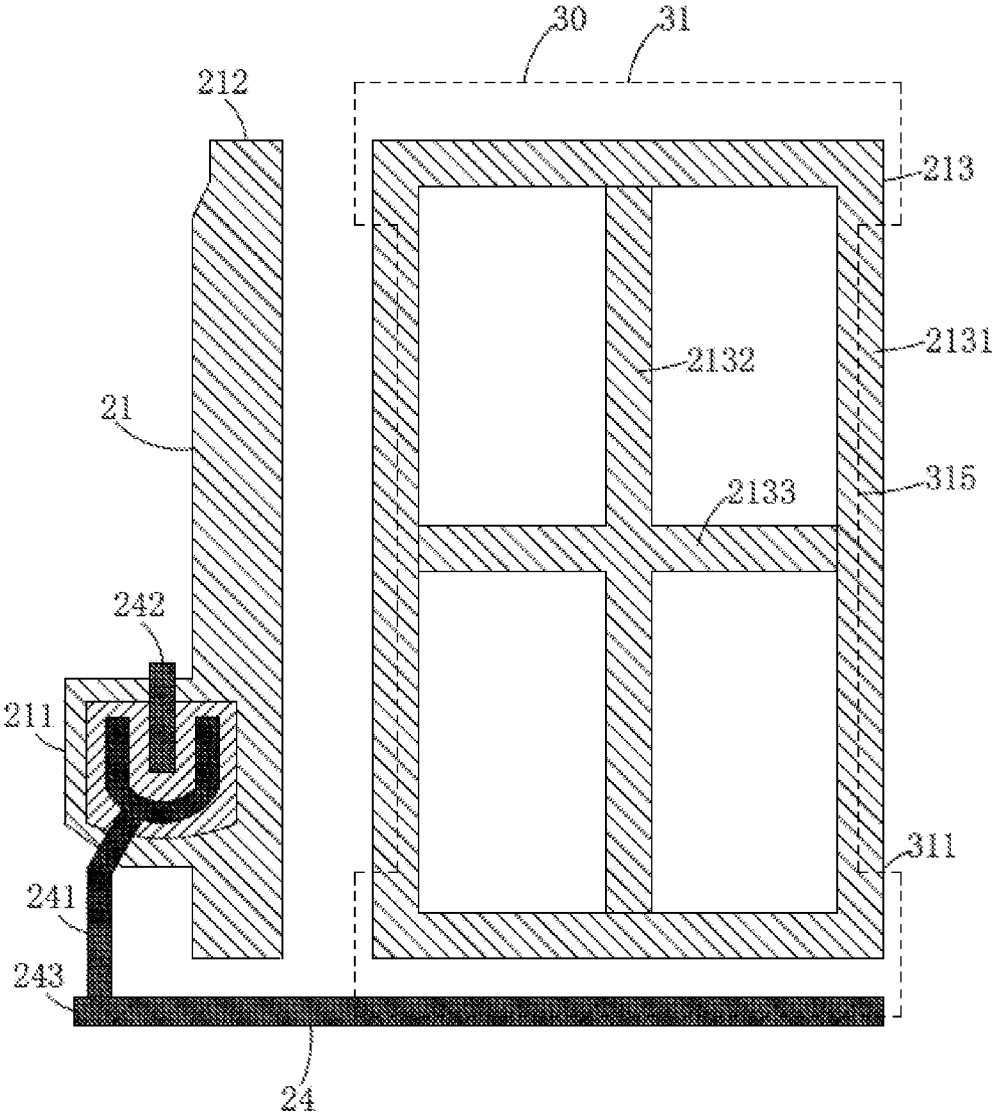


FIG. 8

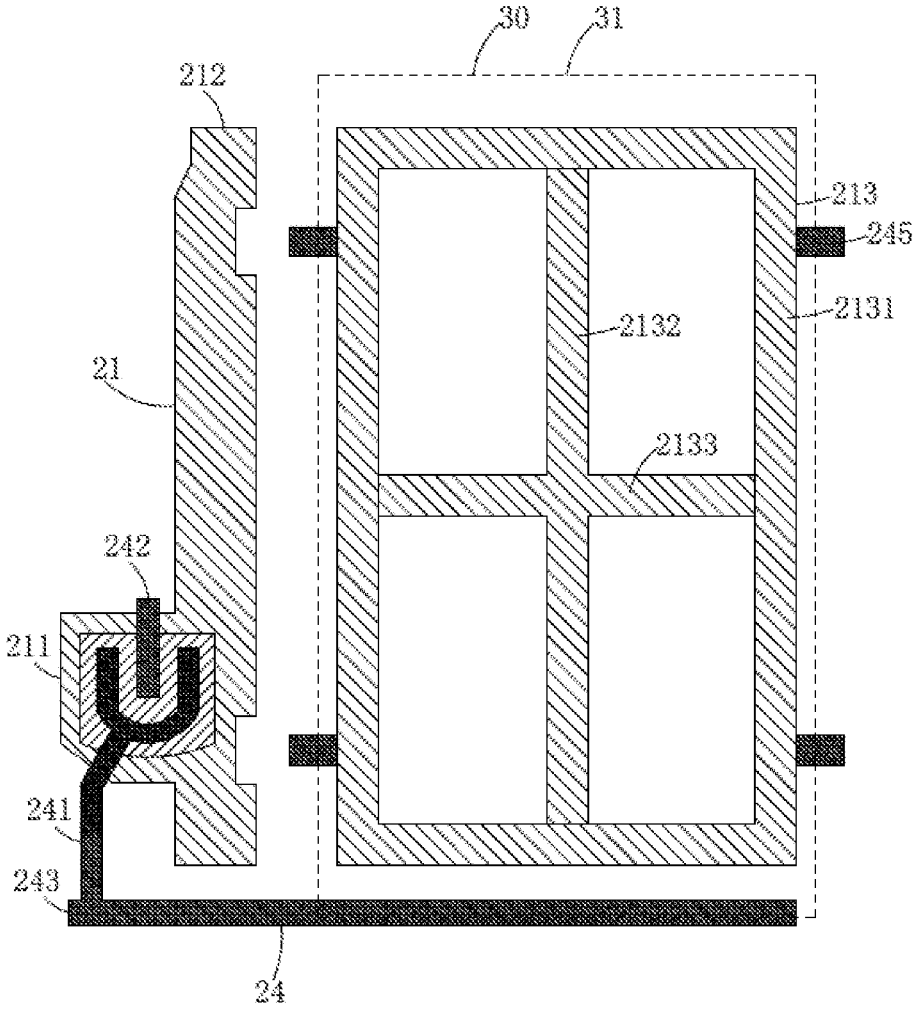


FIG. 9

COA-TYPE ARRAY SUBSTRATE

RELATED APPLICATIONS

[0001] The present application is a National Phase of International Application Number PCT/CN2018/072512, filed on Jan. 12, 2018, and claims the priority of China Application No. 201711484164.6, filed on Dec. 29, 2017.

FIELD OF THE DISCLOSURE

[0002] The disclosure relates to a display technical field, and more particularly to a COA-type array substrate.

BACKGROUND

[0003] Liquid crystal displays (LCDs) have many advantages such as thin body, low power consumption, no radiation and so on, which are widely used in mobile phones, such as personal digital assistants (PDAs), digital cameras, computer screens and notebook screen and so on.

[0004] Most liquid crystal display devices on the market are backlight-type liquid crystal display devices, which include a housing, a liquid crystal panel disposed in the housing, and a backlight module disposed in the housing. A structure of a traditional liquid crystal panel is composed of a color-resisting substrate, a thin film transistor array substrate (TFT Array Substrate), and a liquid crystal layer disposed between the two substrates which a working principle is that a driving voltage is applied on the two substrates to control a rotation of liquid crystal molecules of a liquid crystal layer, and a light of the backlight module is refracted to generate a picture.

[0005] A COA (Color-resisting on Array) technology is a technology for preparing a color-resisting layer on an array substrate to form the COA-type array substrate. Since an alignment problem of the color-resisting substrate and the thin film transistor array substrate does not exist in the liquid crystal display panel of a COA structure, a difficulty of process of manufacturing the liquid crystal display panel during the manufacturing process of the liquid crystal display panel can be reduced, be avoided errors when manufacturing, and then improve a production yield, improve a panel quality.

[0006] The patterned electrode in the COA-type array substrate mainly comprises a first metal layer (M1), a second metal layer (M2), and a transparent conductive layer (ITO) between the separate electrode patterns in the same layer; usually, it is necessary to maintain a safe distance to prevent shorts, which are typically about 5 μm depending on the size resolution, and so on, however, even with some technical measures, problems of patterning electrode residue issues often occur in existing COA-type array substrates, which is more common in the transparent conductive layer (ITO).

[0007] FIG. **1** is a schematic cross-sectional view of a current COA-type array substrate, FIG. **2** is a schematic view of the relative position between a transparent conductive layer and a color-resisting layer in the horizontal direction in the current COA-type array substrate, FIG. **3** is a schematic top view of the current COA-type array substrate; as shown in FIG. **1** to FIG. **3**, the COA-type array substrate, comprises a substrate **100**, a TFT layer **200** disposed on the substrate **100**, a color-resisting layer **300** disposed on the TFT layer **200**, and a transparent conductive layer **400** disposed on the color-resisting layer **300**; the transparent conductive layer **400** comprises a plurality of pixel electrodes **410** set at intervals and arranged in an array, a first light-shielding common electrode **420** located in an interval area **500** of the plurality of the pixel electrodes **410** without connected to the plurality of the pixel electrodes **410**; after the COA-type array substrate and a CF substrate having an entire surface of the common electrode align to form a liquid crystal panels, when the liquid crystal panel displays a screen, a potential of the first light-shielding common electrode **420** is the same as the potential of the entire surface of the common electrode on the CF substrate; therefore, a voltage across the liquid crystal molecules at the position of the first light-shielding common electrode **420** is zero, so that the liquid crystal molecules in the area do not rotate, the area remains dark and a light leakage of the interval area **500** of the pixel is avoided.

[0008] The interval area **500** between the plurality of pixel electrodes **410** comprises a plurality of horizontal interval areas **510** and a plurality of vertical interval areas **520** arranged in vertical cross, the first light-shielding common electrode **420** comprises a plurality of transverse electrodes **4210** and a plurality of longitudinal electrodes **4220** arranged in vertical cross, the plurality of transverse electrodes **4210** are respectively located in the plurality of horizontal interval areas **510**, the plurality of longitudinal electrodes **4220** are respectively located in a plurality of vertical interval areas **520**.

[0009] The color-resisting layer **300** comprises a plurality of color-resisting units **310** set at intervals, the plurality of color-resisting units **310** respectively correspond to a top and bottom sides of a plurality of pixel electrodes respectively, and outer edges of the plurality of color-resisting units **310** extends beyond the outer edges of the plurality of pixel electrodes **410**; due to a large thickness of the color-resisting units **310**, a large difference in a topography easily occurs at the position corresponding to the outer edge of the color-resisting units **310** on the COA-type array substrate; therefore, when the transparent conductive layer **400** of a metal oxide material is formed on the color-resisting layer **300**, a photoresist easily deposits a thick film at the position corresponding to the outer edge of the color-resisting units **310**, which can not be removed by an exposure and development (that is, incomplete exposure), resulting in the metal oxide under the photoresist can not be removed by etching, finally, a metal oxide residue line **600** appears on the side of the pixel electrode **410**, when the metal oxide residue line **600** connects to the transverse electrode **4210** in the pixel electrode **410** and the transverse electrode **4210** in the first light shielding common electrode **420**, an electrical signal of the pixel electrode **410** may not be controlled.

[0010] As shown in FIG. **3**, the TFT layer **200** comprises a first metal layer **2130**, the first metal layer **2130** comprises the first metal layer **2130** comprises the frame-shaped electrode **21310** disposed along a periphery of the pixel electrode **410**, and the frame-shaped electrode **21310** is disposed on the inner side of the color-resisting units **310**, that is, the outer edge of the color-resisting units **310** extends beyond the outer edge of the frame-shaped electrode **21310**, as a result, a Taper angle of the outer edge of the color-resisting units **310** is increased, so that the metal oxide remains on the outer edge of the color-resisting units **310** more seriously; therefore, it is necessary to adopt a method to solve a technical problem.

SUMMARY

[0011] A purpose of a present disclosure is to provide a COA-type array substrate in which an electric signal of a pixel electrode can not be controlled.

[0012] To realize an above purpose, the present disclosure provides the COA-type array substrate which comprises a substrate, a TFT layer disposed on the substrate, a color-resisting layer disposed on the TFT layer, and a transparent conductive layer disposed on the color-resisting layer.

[0013] The transparent conductive layer comprises a plurality of pixel electrodes set at intervals and arranged in an array, a first light-shielding common electrode located in an interval area of the plurality of the pixel electrodes without connected to the plurality of the pixel electrodes.

[0014] The color-resisting layer comprises a plurality of color-resisting units set at intervals, the plurality of color-resisting units respectively correspond to a top and bottom sides of a plurality of pixel electrodes, and outer edges of the plurality of color-resisting units extends beyond the outer edges of the plurality of pixel electrodes respectively.

[0015] The TFT layer comprises a first metal layer disposed on the substrate, a gate insulating layer disposed on the first metal layer, an active layer disposed on the gate insulating layer, a second metal layer on the active layer, and a passivation layer on the second metal layer; the first metal layer comprises a gate, a scan line and a second light-shielding common electrode; the second metal layer comprises a source, a drain and a data line; and the second light-shielding common electrode comprises a frame-shaped electrode arranged along a periphery of the pixel electrode.

[0016] And all or part of the outer edges of the color-resisting units are located on the first metal layer and/or the second metal layer.

[0017] The interval area between the plurality of pixel electrodes comprises a plurality of horizontal interval areas and a plurality of vertical interval areas arranged in vertical cross, the first light-shielding common electrode comprises a plurality of transverse electrodes and a plurality of longitudinal electrodes arranged in vertical cross, the plurality of transverse electrodes are respectively located in the plurality of horizontal interval areas, the plurality of longitudinal electrodes are respectively located in a plurality of vertical interval areas.

[0018] After the COA-type array substrate and a CF substrate having an entire surface of the common electrode align to form a liquid crystal panels, when the liquid crystal panel displays a screen, a potential of the first light-shielding common electrode is the same as the potential of the entire surface of the common electrode on the CF substrate.

[0019] After the COA-type array substrate and the CF substrate having the entire surface of the common electrode align to form the liquid crystal panels, and the first light-shielding common electrode in the COA-type array substrate is electrically connected with the entire surface of the common electrode on the CF substrate.

[0020] The scan lines and the data lines are perpendicular to each other, the transverse electrodes are parallel to the data lines, the pixel electrodes and the color-resisting units are both rectangular, and the pixel electrodes and the color-resisting units have two opposite sides parallel to the data line and two opposite sides parallel to the scan line.

[0021] In a direction parallel to the scan line, a width of the color-resisting units is greater than an interval distance between two adjacent transverse electrodes.

[0022] In the direction parallel to the scan line, the outer edge of the frame-shaped electrode extends beyond the outer edge of the color-resisting units so that a part of the outer edge of the color-resisting units parallel to the scan line is located on the first metal layer.

[0023] In the direction parallel to the scan line, the frame-shaped electrode further comprises a plurality of protrusions protruding from an outer edge of the frame-shaped electrode, the protrusions adjacent to the outer edge of one side of the scan line extends beyond the outer edge of the color-resisting units so that the part of the outer edge of the color-resisting units is located at the upper part of a plurality of the protrusions on the first metal layer.

[0024] In the direction parallel to the scan line, the outer edge of the color-resisting units has a concave part, the concave part comprises a bottom edge, and the bottom edge of the concave part is located on the frame-shaped electrode, so that the outer edge of the recess portion of the color-resisting units is located on the first metal layer.

[0025] A second metal layer comprises a plurality of pad layers distributed along the outer edge of the color-resisting units in the direction parallel to the scan line, the pad layer adjacent to the outer edge of the one side of the scan line extends beyond the outer edge of the color-resisting units so that the part of the outer edge of the color-resisting units is located at the upper part of a plurality of the pad layers on the second metal layer, and the plurality of pad layers are connected to at least one of the data lines, the source and the drain, or connected to none of the data lines, the source and the drain.

[0026] The second light-shielding common electrode further comprises a first strip electrode and a second strip electrode located inside the frame-shaped electrode arranged in vertical cross, both ends of the first strip electrode are vertically connected to the inner sides of the two ends of the frame-shaped electrode parallel to the data line, respectively; both ends of the second strip electrode are perpendicularly connected to an inner side of two ends of the frame-shaped electrode parallel to the scan line, respectively.

[0027] The present disclosure further provides the COA-type array substrate which comprises the substrate, the TFT layer disposed on the substrate, the color-resisting layer disposed on the TFT layer, and the transparent conductive layer disposed on the color-resisting layer.

[0028] The transparent conductive layer comprises the plurality of pixel electrodes set at intervals and arranged in the array, the first light-shielding common electrode located in the interval area of the plurality of the pixel electrodes without connected to the plurality of the pixel electrodes;

[0029] The color-resisting layer comprises the plurality of color-resisting units of the internal setting, the plurality of color-resisting units respectively correspond to the top and bottom sides of the plurality of pixel electrodes, and the outer edge of the plurality of color-resisting units extends beyond the outer edges of the plurality of pixel electrodes respectively.

[0030] The TFT layer comprises the first metal layer disposed on the substrate, the gate insulating layer disposed on the first metal layer, and an active layer disposed on the gate insulating layer, the second metal layer on the active layer, and the passivation layer on the second metal layer; the first metal layer comprises the gate, the scan line and the second light-shielding common electrode, the second metal

layer comprises the source, the drain and the data line; and the second light-shielding common electrode comprises the frame-shaped electrode arranged along a periphery of the pixel electrode.

[0031] All or part of the outer edge of the color-resisting units are located on the first metal layer and/or the second metal layer.

[0032] Wherein, the interval area between the plurality of pixel electrodes comprises the plurality of horizontal interval areas and the plurality of vertical interval areas arranged in vertical cross, the first light-shielding common electrode comprises the plurality of transverse electrodes and the plurality of longitudinal electrodes arranged in vertical cross, the plurality of transverse electrodes are respectively located in the plurality of horizontal interval areas, the plurality of longitudinal electrodes are respectively located in the plurality of vertical interval areas.

[0033] After the COA-type array substrate and the CF substrate having the entire surface of the common electrode align to form the liquid crystal panels, when the liquid crystal panel displays the screen, the potential of the first light-shielding common electrode is the same as the potential of the entire surface of the common electrode on the CF substrate.

[0034] Wherein, after the COA-type array substrate and the CF substrate having the entire surface of the common electrode align to form the liquid crystal panels, and the first light-shielding common electrode in the COA-type array substrate is electrically connected with the entire surface of the common electrode on the CF substrate.

[0035] Wherein, the scan lines and the data lines are perpendicular to each other, the transverse electrodes are parallel to the data lines, the pixel electrodes and the color-resisting units are both rectangular, and the pixel electrodes and the color-resisting units have two opposite sides parallel to the data line and two opposite sides parallel to the scan line.

[0036] Wherein, in the direction parallel to the scan line, the width of the color-resisting units is greater than the interval distance between two adjacent transverse electrodes.

[0037] The beneficial effects of the present disclosure: the COA-type array substrate can be realized by all or part of the outer edge of the color-resisting units are located on the first metal layer and/or the second metal layer, on the one hand, the first metal layer and/or the second metal layer can be used for padding to reduce the topography difference of the COA-type array substrate at the outer edge position of the color-resisting units, so that the thickness of the photoresist coated on the outer edge of the color-resisting units can be reduced so as to be easily removed by the exposure and development when the transparent conductive layer is patterned; in addition, both the first metal layer and the second metal layer have a reflective property, so that the exposure effect can be enhanced and the photoresist coated on the outer edge of the color-resisting units is sufficiently exposed and removed by development; the COA-type array substrate of the present disclosure can eliminate or reduce the metal oxide residue at the outer edge of the color-resisting units through the above two effects and prevent the electrical signal of the pixel electrode from being uncontrollable.

[0038] For further understanding of the features and technical contents of the present disclosure, reference should be made to the following detailed description and accompanying figures of the present disclosure; however, the figures are for reference only and are not intended to limit the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039] The technical solutions of the present disclosure and other beneficial effects will be apparent from the following detailed description of specific embodiments of the present disclosure with reference to the accompanying figures.

[0040] In figures,

[0041] FIG. **1** is a schematic view of a vertical position of each structural layer in a current COA-type array substrate;

[0042] FIG. **2** is a schematic view of a relative position between a transparent conductive layer and a color-resisting layer in a horizontal direction in a current COA-type array substrate;

[0043] FIG. **3** is a schematic top view of a current COA-type array substrate;

[0044] FIG. **4** is a schematic view of an upper and lower position of each structural layer in a COA-type array substrate of the present disclosure;

[0045] FIG. **5** is a schematic view of a relative position between a transparent conductive layer and a color-resisting layer in a horizontal direction in a COA-type array substrate of the present disclosure;

[0046] FIG. **6** is a schematic top view of a first embodiment of a COA-type array substrate of the present disclosure;

[0047] FIG. **7** is a schematic top view of a second embodiment of a COA-type array substrate of the present disclosure;

[0048] FIG. **8** is a schematic top view of a third embodiment of a COA-type array substrate of the present disclosure;

[0049] FIG. **9** is a schematic top view of a fourth embodiment of a COA-type array substrate of the present disclosure;

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0050] To further illustrate the technical means adopted by a present disclosure and the effects thereof, the following describes the preferred embodiments of the present disclosure and the accompanying figures in detail.

[0051] As shown in FIG. **4** to FIG. **9**, the present disclosure provides a COA-type array substrate, comprises a substrate **10**, a TFT layer **20** disposed on the substrate **10**, a color-resisting layer **30** disposed on the TFT layer **10**, and a transparent conductive layer **40** disposed on the color-resisting layer **30**;

[0052] The transparent conductive layer **40** comprises a plurality of pixel electrodes **41** set at intervals and arranged in an array, a first light-shielding common electrode **42** located in an interval area **50** of the plurality of the pixel electrodes **41** and not connected to the plurality of the pixel electrodes **41**;

[0053] The color-resisting layer **30** comprises a plurality of color-resisting units **31** set at intervals, the plurality of color-resisting units **31** correspond to a top and bottom sides of a plurality of pixel electrodes **41** respectively, and an

outer edge of the plurality of color-resisting units **31** extends beyond the outer edges of the plurality of pixel electrodes **41** respectively;

[0054] The TFT layer **20** comprises a first metal layer **21** disposed on the substrate **10**, a gate insulating layer **22** disposed on the first metal layer **21**, and an active layer **23** disposed on the gate insulating layer **22**, a second metal layer **24** on the active layer **23**, and a passivation layer **25** on the second metal layer **24**; the first metal layer **21** comprises a gate **211**, a scan line **212** and a second light-shielding metal **213**, the second metal layer comprises a source **241**, a drain **242** and a data line **243**; and the second light-shielding metal **213** comprises a frame-shaped electrode **2131** arranged along a periphery of the pixel electrode **41**; and the frame-shaped electrode **2131** is used to shield a display defect and a light leakage in the periphery of the pixel electrode **41**.

[0055] All or part of the outer edge of the color-resisting units **31** are located on the first metal layer **21** and/or the second metal layer **24**, on the one hand, the first metal layer **21** and/or the second metal layer **24** can be used for padding to reduce the topography difference of the COA array substrate at the outer edge position of the color-resisting units **31**, so that the thickness of the photoresist coated on the outer edge of the color-resisting units **31** can be reduced so as to be easily removed by the exposure and development when the transparent conductive layer **40** is patterned; in addition, both the first metal layer **21** and the second metal layer **24** have a reflective property, so that the exposure effect can be enhanced and the photoresist coated on the outer edge of the color-resisting units **31** is sufficiently exposed and removed by development; the COA-type array substrate of the present disclosure can eliminate or reduce a residual of the metal oxide at the outer edge of the color-resisting units **31** through the above two effects and prevent the electrical signal of the pixel electrode from being uncontrollable.

[0056] FIG. **4** only shows an upper and lower position of each structural layer in a COA-type array substrate, a relative positional relationship of each structural layer in the horizontal direction in the COA-type array substrate is shown in FIG. **5** to FIG. **9**.

[0057] Specifically, the interval area **50** between the plurality of pixel electrodes **41** comprises a plurality of horizontal interval areas **51** and a plurality of vertical interval areas **52** arranged in vertical cross, the first light-shielding metal **42** comprises a plurality of transverse electrodes **421** and a plurality of longitudinal electrodes **422** arranged in vertical cross, the plurality of transverse electrodes are respectively located in the plurality of horizontal interval areas, the plurality **421** of longitudinal electrodes **422** are respectively located in a plurality of vertical interval areas **52**;

[0058] After the COA-type array substrate and a CF substrate having an entire surface of the common electrode align to form a liquid crystal panels, when the liquid crystal panel displays a screen, a potential of the first light-shielding metal **42** is the same as the potential of the entire surface of the common electrode on the CF substrate; therefore, a voltage across the liquid crystal molecules at the position of the first light-shielding metal **42** is zero, so that the liquid crystal molecules in the area do not rotate, the area remains dark and a light leakage of the interval area **50** of the pixel is avoided.

[0059] Specifically, after the COA-type array substrate and the CF substrate having the entire surface of the common electrode align to form the liquid crystal panels, and the first light-shielding metal **42** in the COA-type array substrate is electrically connected with the entire surface of the common electrode on the CF substrate.

[0060] Specifically, the scan lines **212** and the data lines **243** are perpendicular to each other, the transverse electrodes **421** are parallel to the data lines **243**, the pixel electrodes **41** and the color-resisting units **31** are both rectangular, and the pixel electrodes **41** and the color-resisting units **31** have two opposite sides parallel to the data line **243** and two opposite sides parallel to the scan line **212**.

[0061] Specifically, a material of the transparent conductive layer **40** comprises a metal oxide, and the metal oxide is preferably indium tin oxide (ITO).

[0062] Specifically, in a direction parallel to the scan line **212**, a width of the color-resisting units **31** is greater than an interval distance between two adjacent transverse electrodes **421**, that is, the interval area between the horizontal electrode **421** and the pixel electrode **41** is located on a flat area of the color-resisting units **31**; therefore, in a photolithography process for fabricating the transparent conductive layer **40**, a metal oxide residue does not easily occur between the transverse electrode **421** and the pixel electrode **41**. Therefore, it is not necessary to adjust the relative positions of the color-resisting units **31**, the first metal layer **21** and the second metal layer **24** in the direction parallel to the transverse electrode **421**.

[0063] Specifically, a function of the longitudinal electrode **422** is not to shield the light but to connect several transverse electrodes **421** arranged in parallel, and the liquid crystal display panel needs to be provided with a black matrix for light shielding at the position of the longitudinal electrode **422**, and a shape of the longitudinal electrode **422** is non-linear, which avoids an interference with other electrodes and avoids a signal interference with other electrodes.

[0064] Specifically, the width of the transverse electrode **421** is greater than the width of the longitudinal electrode **422**, and the width of the transverse electrode **421** is linear and has a relatively large width so that the light shielding effect is better, and the liquid crystal display panel does not need to be provided with a black matrix at the location of the transverse electrode **421**.

[0065] Specifically, the transverse electrode **421** is disposed above the scan line **212** of the TFT layer **20**.

[0066] Specifically, the thickness of each of the first metal layer **21** and the second metal layer **24** is 0.2-0.7 μm. In the present disclosure, the position of the outer edge of the color-resisting units **31** is lifted by using one or two 0.2-0.7 μm metal layers, which can reduce the topography difference of the COA-type array substrate at the outer edge position of the color-resisting units, and eliminate or reduce the metal oxide residue at the outer edge of the color-resisting units **31**.

[0067] Preferably, the first metal layer **21** comprises an aluminum (Al) film and a molybdenum (Mo) film stacked together, and the thickness of the first metal layer **21** is 0.39 μm; alternatively, the first metal layer **21** includes a copper (Cu) film and the molybdenum film stacked together, and the thickness of the first metal layer **21** is 0.55 μm.

[0068] Preferably, the first metal layer **21** comprises the aluminum film and the molybdenum film stacked together, and the thickness of the first metal layer **21** is 0.39 μm; alternatively, the first metal layer **21** includes the copper film

and the molybdenum film stacked together, and the thickness of the first metal layer **21** is 0.55 μm.

[0069] See FIG. **6**, which is a first embodiment of the COA-type array substrate of the present disclosure, in the first embodiment, in the direction parallel to the scan line **212**, the outer edge of the frame-shaped electrode **2131** extends beyond the outer edge of the color-resisting units **31** so that a part of the outer edge of the color-resisting units **31** parallel to the scan line **212** is located on the first metal layer **21**. An implementation of the technical means can be: the position of the color-resisting units **31** is unchanged, and the outer edge of the frame-shaped electrode **2131** extends beyond the outer edge of the color-resisting units **31**, so that a mask of the first metal layer **21** needs to be changed; the implementation of the technical means can also be: the position of the frame-shaped electrode **2131** is unchanged, and the outer edge of the color-resisting units **31** is retreated to the inner side of the frame-shaped electrode **2131**, so that the mask of the color-resisting layer **30** needs to be changed; the technical solution can avoid the metal oxide residue at the outer edge of the color-resisting units **31** and avoid the situation that the electrical signal of the pixel electrode can not be controlled. The change of the first metal layer **21** or the color-resisting layer **30** is premised on the electrical properties that do not significantly affect an aperture ratio (AR) and a parasitic capacitance.

[0070] Specifically, the distance between the outer edge of the frame-shaped electrode **2131** exceeding the outer edge of the color-resisting units **31** is 1-2 μm.

[0071] Specifically, in the first embodiment, the outer edge of the color-resisting units **31** may also be located on the second metal layer **24**, that is, the second metal layer **24** is formed above the frame-shaped electrode **2131** corresponding to the first metal layer **21**, and an overlap of the first metal layer **21** and the second metal layer **24** can greatly minimize the topography difference of the outer edge of color-resisting units **31**.

[0072] See FIG. **7**, which is a second embodiment of the COA-type array substrate of the present disclosure, in the second embodiment, in the direction parallel to the scan line **212**, the frame-shaped electrode **2131** further comprises a plurality of protrusions **2134** protruding from an outer edge of the frame-shaped electrode **2131**, the protrusions **2134** adjacent to the outer edge of a one side of the scan line **212** extends beyond the outer edge of the color-resisting units **31** so that the part of the outer edge of the color-resisting units **31** is located on the upper part of a plurality of the protrusions **2134** on the first metal layer **21**. The implementation of the technical means can be: the position of the color-resisting units **31** is unchanged, and the outer edge of the frame-shaped electrode **2131** extends beyond the outer edge of the color-resisting units **31**, so that the mask of the first metal layer **21** needs to be changed. The technical solution can prevent the metal oxide from remaining on the plurality of protrusions **2134** so that a metal oxide residual line at the outer edge of the color-resisting units **31** is divided into a plurality of discrete segments, and the pixel electrode **41** and the first light-shielding metal **42** can not be connected. The change of the first metal layer **21** is premised on the electrical properties that do not significantly affect the aperture ratio (AR) and the parasitic capacitance.

[0073] Specifically, the part of the scan line **212** corresponding to the plurality of protrusions **2134** is concave, so as to ensure a safe distance.

[0074] Specifically, the distance between the protrusions **2134** on the side near the scan line **212** and the outer edge of the color-resisting units **31** is 1-2 μm.

[0075] Preferably, two protrusions **2134** are respectively distributed on two sides of the frame-shaped electrode **2131** parallel to the scan line **212**, and the two protrusions **2134** are respectively located at the both ends of the side edge.

[0076] Specifically, in the second embodiment, the outer edge of the color-resisting units **31** may also be located on the second metal layer **24**, that is, the second metal layer **24** is formed above the frame-shaped electrode **2131** corresponding to the first metal layer **21**, and the overlap of the first metal layer **21** and the second metal layer **24** can greatly minimize the topography difference of the outer edge of color-resisting units **31**.

[0077] See FIG. **8**, which is a third embodiment of the COA-type array substrate of the present disclosure, in the third embodiment, in the direction parallel to the scan line **212**, the outer edge of the color-resisting units **31** has a concave part **311**, the concave part **311** comprises a bottom edge **315**, and the bottom edge **315** of the concave part **311** is located on the frame-shaped electrode **2131**, so that the outer edge of the concave part of the color-resisting units **31** is located on the first metal layer **21**.The implementation of the technical means can be: the position of the frame-shaped electrode **2131** is unchanged, and the part of the outer edge of the color-resisting units **31** needs to be concave, so that the mask of the color-resisting layer **30** needs to be changed. The technical solution can prevent the metal oxide from remaining on the plurality of protrusions **2134** so that the metal oxide residual line at the outer edge of the color-resisting units **31** is divided into a plurality of discrete segments, and the pixel electrode **41** and the first light-shielding metal **42** can not be connected. The change of the color-resisting layer **30** is premised on the electrical properties that do not significantly affect the aperture ratio (AR) and the parasitic capacitance.

[0078] Specifically, the distance between the outer edge of the frame-shaped electrode **2131** exceeding the bottom edge **315** of the concave part **311** is 1-2 μm.

[0079] Preferably, the concave part **311** is respectively distributed on two sides of the frame-shaped electrode **2131** parallel to the scan line **212**, and two ends of the concave part **311** are respectively located at both ends of the side edge.

[0080] Preferably, in the third embodiment, the bottom edge **315** of the concave part **311** is also located on the second metal layer **24**, that is, the second metal layer **24** is formed above the frame-shaped electrode **2131** corresponding to the first metal layer **21**, and the overlap of the first metal layer **21** and the second metal layer **24** can greatly minimize the topography difference of the outer edge of color-resisting units **31**.

[0081] See FIG. **9**, which is a fourth embodiment of the COA-type array substrate of the present disclosure, in the fourth embodiment, the second metal layer **24** comprises a plurality of pad layers distributed along the outer edge of the color-resisting units **31** in the direction parallel to the scan line **212**, the pad layer **245** adjacent to the outer edge of the one side of the scan line **212** extends beyond the outer edge of the color-resisting units **31** so that the part of the outer edge of the color-resisting units **31** is located on the upper part of a plurality of the pad layers **245** on the second metal layer **24**, and the plurality of pad layers **245** are connected

to at least one of the data lines **243**, the source **241** and the drain **242**, or none of the data lines **243**, the source **241** and the drain **242**. The technical solution is realized by changing the mask of the second metal layer **24** so that the metal oxide can be prevented from remaining at the plurality of liner layers **245**, so that the metal oxide residual line at the outer edge of the color-resisting units **31** is divided into a plurality of discrete segments, and the pixel electrode **41** and the first light-shielding metal **42** can not be connected. The change of the mask of the second metal layer **24** is premised on the electrical properties that do not significantly affect the aperture ratio (AR) and the parasitic capacitance.

[0082] Specifically, the distance between the pad layer **245** and the outer edge of the side near the scan line **212** exceeding the outer edge of the concave part **311** is 1-2 μm.

[0083] Preferably, two pad layers **245** are respectively distributed on two sides of the color-resisting units **31** parallel to the scan line **212**, and the two pad layers **245** are respectively located at the both ends of the side edge.

[0084] Specifically, in the fourth embodiment, the outer edge of the color-resisting units **31** may also be located on the first metal layer **21**, that is, the first metal layer **21** is formed above the pad layer **245** corresponding to the second metal layer **24**, and the overlap of the first metal layer **21** and the second metal layer **24** can greatly minimize the topography difference of the outer edge of color-resisting units **31**.

[0085] It should be noted that in addition to adjusting the relative positions of the color-resisting units **31**, the first metal layer **21** and the second metal layer **24**, the COA-type array substrate of the present disclosure may also be manufactured by using a half-tone mask process to form a color-resisting layer **30**, so as to reduce the taper angle of the outer edge of the color-resisting units **31**, and reduce or eliminate the metal oxide residue.

[0086] Specifically, the pixel electrode **41** is a "*" shaped electrode.

[0087] Specifically, the second light-shielding metal **213** further comprises a first strip electrode **2132** and a second strip electrode **2133** located inside the frame-shaped electrode **2131** arranged in vertical cross, both ends of the first strip electrode **2132** are vertically connected to the inner sides of the two ends of the frame-shaped electrode **2131** parallel to the data line **243**, respectively; both ends of the second strip electrode **2133** are perpendicularly connected to an inner side of two ends of the frame-shaped electrode **2131** parallel to the scan line **212**, respectively, and the first strip electrode **2132** and the second strip electrode **2133** are used for shielding the display defect and the light leakage at a cruciform keel of the pixel electrode **41**.

[0088] In general, it is difficult to control an inversion of the liquid crystal molecules at the periphery of the pixel electrode **41** and the cruciform keel, when the pixel is in a bright state, the display defect is prone to occur, and when the pixel is in a dark state, light leakage is prone to occur, after the second light-shielding metal **213** is disposed at the position corresponding to the periphery of the pixel electrode **41** and the cruciform keel in the present disclosure, and the second light-blocking common electrode **213** blocks the display defect and the light leakage in the area and controls the voltage on both sides of the liquid crystal layer by means of a physical light-shielding manner, so as to prevent an abnormal display and light leakage.

[0089] Specifically, the second light-shielding metal **213** is not connected to the first light-shielding metal **42** and the entire surface of the CF substrate, the second light-shielded metal **213** is provided with a separate voltage signal by a common electrode line, which is capable of shielding a lateral electric field and is capable of controlling a turn of the liquid crystal molecules around the pixel electrode **41** and the keel to eliminate the abnormal display and light leakage and improve the display effect.

[0090] Specifically, the transparent conductive layer **40** has the thickness of about 40 nm.

[0091] Specifically, the gate insulating layer **22** and the passivation layer **25** may be a silicon nitride (SiNx) film.

[0092] In summary, the present disclosure provides the COA-type array substrate, which can be realized by all or part of the outer edge of the color-resisting units are located on the first metal layer and/or the second metal layer, on the one hand, the first metal layer and/or the second metal layer can be used for padding to reduce the topography difference of the COA-type array substrate at the outer edge position of the color-resisting units, so that the thickness of the photoresist coated on the outer edge of the color-resisting units can be reduced so as to be easily removed by the exposure and development when the transparent conductive layer is patterned; in addition, both the first metal layer and the second metal layer have a reflective property, so that the exposure effect can be enhanced and the photoresist coated on the outer edge of the color-resisting units is sufficiently exposed and removed by development; the COA-type array substrate of the present disclosure can eliminate or reduce the metal oxide residue at the outer edge of the color-resisting units through the above two effects and prevent the electrical signal of the pixel electrode from being uncontrollable.

[0093] In the foregoing, other various modifications and variations may be made by those skilled in the art according to the technical solutions and technical ideas of the present disclosure, and all such changes and modifications shall fall within the protection scope of the claims of the present disclosure.

What is claimed is:

1. A COA-type array substrate, comprises a substrate, a TFT layer disposed on the substrate, a color-resisting layer disposed on the TFT layer, and a transparent conductive layer disposed on the color-resisting layer;

the transparent conductive layer comprises a plurality of pixel electrodes set at intervals and arranged in an array, a first light-shielding common electrode located in an interval area of the plurality of pixel electrodes without connected to the plurality of pixel electrodes;

the color-resisting layer comprises a plurality of color-resisting units set at intervals, the plurality of color-resisting units respectively correspond to a top and bottom sides of the plurality of pixel electrodes, and outer edges of the plurality of color-resisting units respectively extend beyond outer edges of the plurality of pixel electrodes;

the TFT layer comprises a first metal layer disposed on the substrate, a gate insulating layer disposed on the first metal layer, an active layer disposed on the gate insulating layer, a second metal layer on the active layer, and a passivation layer on the second metal layer; the first metal layer comprises a gate, a scan line and a second light-shielding common electrode; the second metal layer comprises a source, a drain and a data line; and the second light-shielding common electrode com-

prises a frame-shaped electrode arranged along a periphery of the pixel electrode; and

all or part of the outer edges of the color-resisting units are located on the first metal layer and/or the second metal layer.

2. The COA-type array substrate according to claim **1**, wherein the interval area between the plurality of pixel electrodes comprises a plurality of horizontal interval areas and a plurality of vertical interval areas arranged in vertical cross, the first light-shielding common electrode comprises a plurality of transverse electrodes and a plurality of longitudinal electrodes arranged in vertical cross, the plurality of transverse electrodes are respectively located in the plurality of horizontal interval areas, the plurality of longitudinal electrodes are respectively located in a plurality of vertical interval areas;

after the COA-type array substrate and a CF substrate having an entire surface of the common electrode align to form a liquid crystal panel, when the liquid crystal panel displays a screen, a potential of the first light-shielding common electrode is the same as the potential of the entire surface of the common electrode on the CF substrate.

3. The COA-type array substrate according to claim **2**, wherein after the COA-type array substrate and the CF substrate having the entire surface of the common electrode align to form the liquid crystal panel, the first light-shielding common electrode in the COA-type array substrate is electrically connected with the entire surface of the common electrode on the CF substrate.

4. The COA-type array substrate according to claim **1**, wherein the scan lines and the data lines are perpendicular to each other, the transverse electrodes are parallel to the data lines, the pixel electrodes and the color-resisting units are both rectangular, and the pixel electrodes and the color-resisting units have two opposite sides parallel to the data line and two opposite sides parallel to the scan line.

5. The COA-type array substrate according to claim **4**, wherein in a direction parallel to the scan line, a width of the color-resisting units is greater than an interval distance between two adjacent transverse electrodes.

6. The COA-type array substrate according to claim **5**, wherein in the direction parallel to the scan line, the outer edge of the frame-shaped electrode extends beyond the outer edge of the color-resisting units so that a part of the outer edge of the color-resisting units parallel to the scan line is located on the first metal layer.

7. The COA-type array substrate according to claim **5**, wherein in the direction parallel to the scan line, the frame-shaped electrode further comprises a plurality of protrusions protruding from an outer edge of the frame-shaped electrode, the protrusions adjacent to the outer edge of one side of the scan line extends beyond the outer edge of the color-resisting units so that the part of the outer edge of the color-resisting units is located at the upper part of a plurality of the protrusions on the first metal layer.

8. The COA-type array substrate according to claim **5**, wherein in the direction parallel to the scan line, the outer edge of the color-resisting units has a concave part, the concave part comprises a bottom edge, and the bottom edge of the concave part is located on the frame-shaped electrode, so that the outer edge of the concave part of the color-resisting units is located on the first metal layer.

9. The COA-type array substrate according to claim **5**, wherein the second metal layer comprises a plurality of pad layers distributed along the outer edge of the color-resisting units in the direction parallel to the scan line, the pad layer adjacent to the outer edge of the one side of the scan line extends beyond the outer edge of the color-resisting units so that the part of the outer edge of the color-resisting units is located at the upper part of a plurality of the pad layers on the second metal layer, and the plurality of pad layers are connected to at least one of the data lines, the source and the drain, or connected to none of the data lines, the source and the drain.

10. The COA-type array substrate according to claim **4**, wherein the second light-shielding common electrode further comprises a first strip electrode and a second strip electrode located inside the frame-shaped electrode arranged in vertical cross, both ends of the first strip electrode are vertically connected to the inner sides of the two ends of the frame-shaped electrode parallel to the data line, respectively; both ends of the second strip electrode are perpendicularly connected to an inner side of two ends of the frame-shaped electrode parallel to the scan line, respectively.

11. A COA-type array substrate, comprises a substrate, a TFT layer disposed on the substrate, a color-resisting layer disposed on the TFT layer, and a transparent conductive layer disposed on the color-resisting layer;

the transparent conductive layer comprises a plurality of pixel electrodes set at intervals and arranged in an array, a first light-shielding common electrode located in an interval area of the plurality of the pixel electrodes without connected to the plurality of pixel electrodes;

the color-resisting layer comprises a plurality of color-resisting units set at intervals, the plurality of color-resisting units respectively correspond to a top and bottom sides of a plurality of pixel electrodes, and outer edges of the plurality of color-resisting units extends beyond outer edge of the plurality of pixel electrodes;

the TFT layer comprises a first metal layer disposed on the substrate, a gate insulating layer disposed on the first metal layer, an active layer disposed on the gate insulating layer, a second metal layer on the active layer, and a passivation layer on the second metal layer; the first metal layer comprises a gate, a scan line and a second light-shielding common electrode; the second metal layer comprises a source, a drain and a data line; and the second light-shielding common electrode comprises a frame-shaped electrode arranged along a periphery of the pixel electrode; and

all or part of the outer edges of the color-resisting units are located on the first metal layer and/or the second metal layer. wherein, the interval area between the plurality of pixel electrodes comprises a plurality of horizontal interval areas and a plurality of vertical interval areas arranged in vertical cross, the first light-shielding common electrode comprises a plurality of transverse electrodes and a plurality of longitudinal electrodes arranged in vertical cross, the plurality of transverse electrodes are respectively located in the plurality of horizontal interval areas, the plurality of longitudinal electrodes are respectively located in a plurality of vertical interval areas;

after the COA-type array substrate and a CF substrate having an entire surface of the common electrode align

to form a liquid crystal panels, when the liquid crystal panel displays a screen, a potential of the first light-shielding common electrode is the same as the potential of the entire surface of the common electrode on the CF substrate.

wherein, after the COA-type array substrate and the CF substrate having the entire surface of the common electrode align to form the liquid crystal panels, and the first light-shielding common electrode in the COA-type array substrate is electrically connected with the entire surface of the common electrode on the CF substrate.

wherein, the scan lines and the data lines are perpendicular to each other, the transverse electrodes are parallel to the data lines, the pixel electrodes and the color-resisting units are both rectangular, and the pixel electrodes and the color-resisting units have two opposite sides parallel to the data line and two opposite sides parallel to the scan line.

wherein in a direction parallel to the scan line, a width of the color-resisting units is greater than an interval distance between two adjacent transverse electrodes.

12. The COA-type array substrate according to claim **11**, wherein in the direction parallel to the scan line, the outer edge of the frame-shaped electrode extends beyond the outer edge of the color-resisting units so that a part of the outer edge of the color-resisting units parallel to the scan line is located on the first metal layer.

13. The COA-type array substrate according to claim **11**, wherein in the direction parallel to the scan line, the frame-shaped electrode further comprises a plurality of protrusions protruding from an outer edge of the frame-shaped electrode, the protrusions adjacent to the outer edge of one side of the scan line extends beyond the outer edge of the color-resisting units so that the part of the outer edge of the color-resisting units is located at the upper part of a plurality of the protrusions on the first metal layer.

14. The COA-type array substrate according to claim **11**, wherein in the direction parallel to the scan line, the outer edge of the color-resisting units has a concave part, the concave part comprises a bottom edge, and the bottom edge of the concave part is located on the frame-shaped electrode, so that the outer edge of the concave part of the color-resisting units is located on the first metal layer.

15. The COA-type array substrate according to claim **11**, wherein the second metal layer comprises a plurality of pad layers distributed along the outer edge of the color-resisting units in the direction parallel to the scan line, the pad layer adjacent to the outer edge of the one side of the scan line extends beyond the outer edge of the color-resisting units so that the part of the outer edge of the color-resisting units is located at the upper part of a plurality of the pad layers on the second metal layer, and the plurality of pad layers are connected to at least one of the data lines, the source and the drain, or connected to none of the data lines, the source and the drain.

16. The COA-type array substrate according to claim **11**, wherein the second light-shielding common electrode further comprises a first strip electrode and a second strip electrode located inside the frame-shaped electrode and crossed vertically, both ends of the first strip electrode are vertically connected to the inner sides of the two ends of the frame-shaped electrode parallel to the data line, respectively; both ends of the second strip electrode are perpendicularly connected to an inner side of two ends of the frame-shaped electrode parallel to the scan line, respectively.

* * * * *